DOCUMENT RESUME

ED 475 922 IR 021 920

AUTHOR	Ba, Harouna; Martin, Wendy; Diaz, Odalys
TITLE	The JASON Project's Multimedia Science Curriculum Impact on Student Learning: A Summary of the Year One Evaluation Report.
INSTITUTION	Education Development Center, New York, NY. Center for Children and Technology.
SPONS AGENCY	JASON Foundation for Education, Needham Heights, MA.; Department of Education, Washington, DC.
PUB DATE	2002-06-00
NOTE	13p.; In: NECC 2002: National Educational Computing Conference Proceedings (23rd, San Antonio, Texas, June 17-19, 2002); see IR 021 916. This booklet was adapted from CCT's "The JASON Project's Multi-Media Science Curriculum Impact on Student Learning: Final Evaluation Report-Year One." A CCT (Center for Children & Technology) Report, March 2002.
AVAILABLE FROM	For full text: http://confreg.uoregon.edu/necc2002/. For full text: http://www2.edc.org/CCT/admin/publications/report/jason_islsum02.pdf.
PUB TYPE	Reports - Descriptive (141) -- Speeches/Meeting Papers (150)
EDRS PRICE	EDRS Price MF01/PC01 Plus Postage.
DESCRIPTORS	Earth Science; Elementary Secondary Education; *Instructional Effectiveness; *Instructional Material Evaluation; Learning Activities; Multimedia Materials; *Science Curriculum; Science Education; Science Instruction; *Science Programs; Science Projects; Scientific Concepts; Space Sciences

ABSTRACT

For the past 13 years the JASON Project has offered students and teachers a unique opportunity to learn about how the earth and space systems support life, and technologies used to study the earth-space system. The JASON Project aspires to help teachers to increase student learning of content-specific information; and to engage students in complex, difficult tasks that lead to the development of scientific thinking and problem-solving skills. In doing so, it provides teachers with instructional tools that bring together academic standards, the rich research environment of a new curriculum topic each year, and student performance measures that support state standards and assessment initiatives. The Center for Children and Technology (CCT) proposed to study the impact of the JASON Project on a diverse population of students' science experiences and learning by undertaking a 1-year comprehensive evaluation of student learning in the JASON multimedia environment. The major design components of CCT's study and its assessment techniques are illustrated in Figure One of this report summary. The first-year study showed that the JASON Project is used in diverse ways in diverse contexts, and that the variety of use significantly influences how teachers and students experience the JASON multimedia curriculum. CCT researchers worked with 9 science teachers and 269 students from 8 middle schools located around the country in Arkansas, California, Michigan, New York, Ohio, Pennsylvania, Texas, and Wisconsin. This report summary provides information on: JASON impact on teachers; JASON student learning profiles; JASON impact on student learning; common contextual issues

Reproductions supplied by EDRS are the best that can be made
from the original document.

and challenges; and recommendations. (AEF)

Reproductions supplied by EDRS are the best that can be made
from the original document.

THE JASON PROJECT'S MULTIMEDIA SCIENCE CURRICULUM IMPACT ON STUDENT LEARNING

A SUMMARY OF THE YEAR ONE EVALUATION REPORT

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

P.S.—Calegari

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

CENTER FOR CHILDREN & TECHNOLOGY

BEST COPY AVAILABLE

IR021920

ED 475 922

CCT REPORTS
MARCH 2002

THE JASON PROJECT'S MULTIMEDIA SCIENCE CURRICULUM IMPACT ON STUDENT LEARNING

A SUMMARY OF THE YEAR ONE EVALUATION REPORT

SPONSORED BY

THE JASON FOUNDATION FOR EDUCATION
US DEPARTMENT OF EDUCATION STAR SCHOOL PROGRAM

PREPARED BY

HAROUNA BA
WENDY MARTIN
ODALYS DIAZ

CENTER FOR CHILDREN & TECHNOLOGY

EDUCATION DEVELOPMENT CENTER, INC.
96 Morton Street, 7th floor New York, New York 10014 tel 212.807.4200 fax 212.633.8804 tty 212.807.4284 web www.edc.org/CCT

THE JASON PROJECT

For the past thirteen years the JASON Project has offered students and teachers a unique opportunity to learn about how the earth and space systems support life, and technologies used to study the earth-space system. The project today reaches a diverse population of approximately 25,000 teachers and 1 million students around the country. Both populations are diverse in terms of ethnicity, community profile (geography and income), teaching experience, number of years in the JASON program, student achievement levels, as well as experience with technology and science.

The project's model for the delivery of science is inclusive of technology, focuses on scientists doing science in the context of a research expedition, relates science to other subject domains and provides for interactive learning. It brings educators and students together to construct their own knowledge base by putting science concepts and skills to work in a media-based anchor. Ultimately JASON's goal is to engage students in lifelong learning.

The JASON Project aspires to help teachers to increase student learning of content-specific information; and to engage students in complex, difficult tasks that lead to the development of scientific thinking and problem-solving skills. In doing so, it provides teachers with instructional tools that bring together academic standards, the rich research environment of a new curriculum topic each year, and student performance measures that support state standards and assessment initiatives.

JASON's multimedia curriculum model comprises a holistic collection of resources, include a print curriculum and prologue video, live exposition broadcasts and update video, and Team JASON Online:

A) The **print curriculum** mirrors researchers' work in the field or lab, and includes a video, which introduces and reinforces key curriculum topics and themes, as well as models fieldwork.

B) The **live expedition Tele-presence**, central to the JASON Multimedia Science Curriculum, helps students become a part of the research team, experience the expedition firsthand, and relate their work to that of the researchers. It is held annually at a specific location for a two-week period, and involves research and Argonaut teams (scientists, teachers, and students), technical and broadcast staffs, JASON partner sites, and the local community.

C) **Team JASON Online** (TJO) is a set of integrated online interactions (e.g., teacher-directed exercises, discussion groups, chat sessions, additional curriculum exercises, assessment tools, online journals, etc.) used by teachers, students, and scientists to articulate and share their understanding of science concepts, skills, vocabulary, and projects.

JASON's media-based research expedition provides an authentic, complex problem-solving environment to work in. The project's curriculum emphasizes the acquisition of thinking and problem-solving skills, as well as core science content appropriate for the middle grades. Students engage in hands-on research that requires them to pose hypotheses, then devise methods and procedures for solving problems. Student experiments are central to the JASON curriculum; they require a broad range of competencies, are often interdisciplinary in focus and require student initiative and creativity.

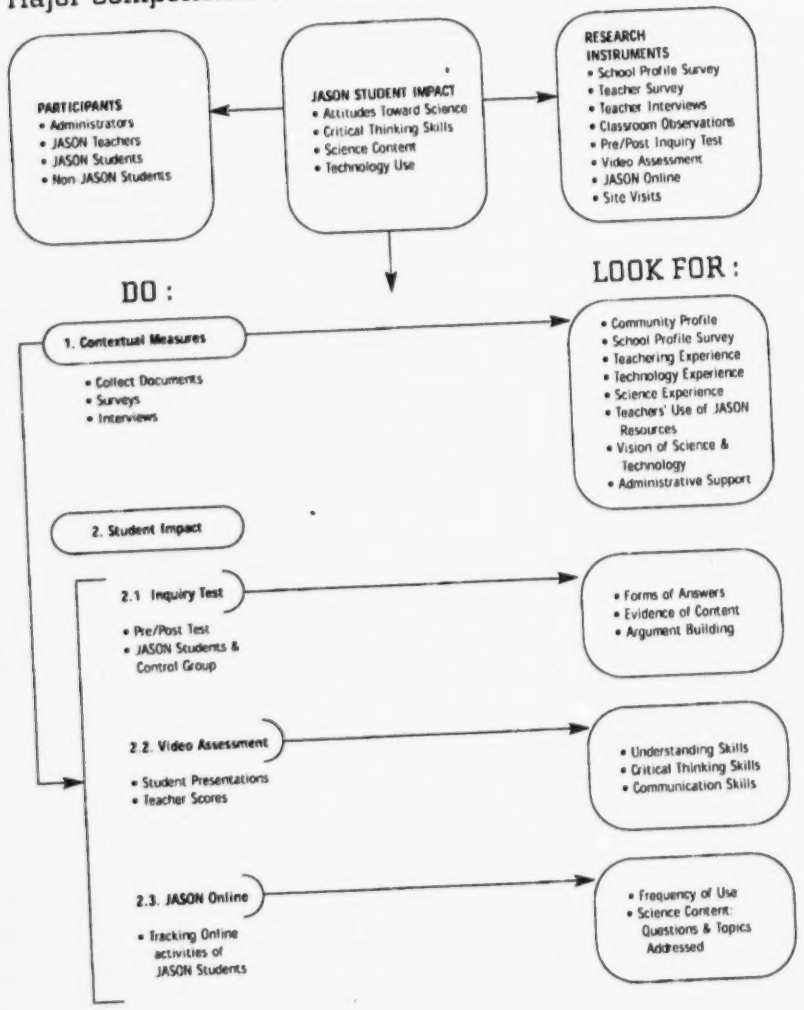
As is widely known, one of the biggest challenges facing teachers is state-mandated assessment. Many teachers face rapidly mounting pressures to demonstrate student competencies. Caught on the horns of an assessment dilemma, they are increasingly held accountable for preparing their students to do well on the standardized achievement tests, but expected at the same

time to teach their students to think critically, explore deep content, and use technology to create project work. Most teachers are reluctant to spend a great deal of time on test preparation recognizing that it impoverishes the curriculum, but feel they have little choice. A constructive response to this dilemma is multimedia projects that engage students in real science explorations and help teachers who have not yet become deeply familiar with inquiry-based pedagogical methods to learn along with their students how to manage and guide such projects. Such projects provide intellectual and material scaffolding for new teaching with new media in an educational climate that demands old accountability measures of teachers while also insisting that they integrate technology into new ways of teaching.

The Center for Children and Technology (CCT) proposed to study the impact of the JASON Project on a diverse population of students' science experiences and learning by undertaking a one-year comprehensive evaluation of student learning in the JASON multimedia environment. The major design components of CCT's study and its assessment techniques are illustrated in Figure 1.

This booklet has been adapted from CCT's *The JASON Project's Multi-media Science Curriculum Impact on Student Learning: Final Evaluation Report—Year One*, available online at www.edc.org/cct.

Figure 1 :
Major Components of the Jason Year One Study



JASON SCHOOLS AND TEACHER PROFILES

The first-year study showed that the JASON Project is used in diverse ways in diverse contexts, and that the variety of use significantly influences how teachers and students experience the JASON multimedia curriculum. The schools participating in the study differed along numerous dimensions, including type of community, ethnic makeup of students, socioeconomic status, number of students and teachers in the school, grade levels in the school, school achievement, and number of teachers and students involved in JASON.

CCT researchers worked with nine science teachers and 269 students from eight middle schools located around the country in Arkansas, California, Michigan, New York, Ohio, Pennsylvania, Texas and Wisconsin. The schools have the following characteristics: grades 6 to 8; low student/teacher ratio; average to above-average school achievement; and an average of 400 JASON students. Most of the schools serve mainly white low-to-middle-income students. However, one of our JASON classrooms consists of academically at-risk black students, and another classroom has mainly low-income Hispanic students. All nine of the participating teachers taught science. They are mainly white and female, and have an average teaching experience of 20 years, technology experience of eight years and JASON experience of five years. These teachers are not the only JASON teachers in their schools. There is an average of five JASON teachers per school participating in this study.

The diversity of the eight sites in the study extended beyond demographic and school characteristics. There was also significant variation at the classroom level, and the ways in which the JASON curriculum was used by students and teachers. In terms of classroom variation, one of the most important differences among the eight sites was the way in which class schedules

were organized. Two of the study schools—Philadelphia and Michigan—had very flexible schedules, which allowed the teachers to engage their students in extended labs and activities. The school in Wisconsin had some flexibility as well, but the teachers could have extended periods only a few times a year. All other schools had standard class periods of about 45-50 minutes, except for the school in Ohio, which had very short 35-minute class periods.

JASON IMPACT ON TEACHERS

JASON changes teaching practice.

- **Promotes the use of alternative assessments, such as presentations and portfolios**
- **Encourages project-based learning**
- **Increases collaboration among teachers**
- **Supports an interdisciplinary approach to learning**

A number of teachers mentioned that as a result of their participation in JASON, their teaching practices have changed in terms of collaboration, project-based learning and alternative assessment. Teachers noted that JASON lends itself to project-based learning. All of the teachers requested student to present projects as part of their JASON work. Some teachers asked that their students do more active group work. One teacher took the presentation idea one step further and required that all the students teach part of the JASON curriculum for about a week using a poster or display, or PowerPoint as part of their presentation.

Another significant change in teaching practice noted by both teachers and administrators was that a school's involvement with JASON often led to an increase in collaboration among teachers in and across grade levels. More often, JASON inspired collaboration among teachers who taught different

subjects within the same grade. Along with modeling teamwork and problem-solving, the study participants noted that collaboration among teachers enabled them to take an interdisciplinary approach to a single large topic. One principal observed that although her school theoretically encouraged collaboration among teachers, she realized that "You need something like a JASON to make it happen."

Some teachers mentioned using more varied methods to evaluate student performance. One teacher said that she uses "more alternate assessments where I'm looking at [students'] projects and their presentations rather than giving them tests." Another said that her involvement with JASON encouraged her to try new assessment techniques: "I had heard about portfolios in other workshops, but I hadn't thought about incorporating them until JASON. It lends itself to a portfolio because of the activities, they're usually building something or graphing or sketching something."

JASON increases teachers' use of technology.

- **Serves as an impetus to use a variety of digital tools**
- **Provides a wealth of resources to teachers**
- **Spurs the development of technology infrastructure in schools**
- **Instructs teachers how to take advantage of available technology**
- **Encourages the use of scientific instruments as well as computers**

Teachers claimed their involvement with the JASON Project has pushed them to make greater use of technology than they did previously. Although not all teachers were able to take advantage of Team JASON Online because of limited access to computers in their classrooms or a lack of training in the TJO environment, a number of teachers have said that TJO has given them the impetus to use computers in their teaching. Even one teacher who has not been able to take advantage of Team JASON Online with her students observed that JASON prompted her to use other kinds of technology in her classroom. Teachers noted that the impact of JASON on technology use extends beyond the classroom.

JASON STUDENT PROFILES

We worked with 269 JASON students with different socioeconomic and ethnic backgrounds. More than half (60%) were in sixth grade. They were 44% female and 55% male. They had different achievement levels, with one entire "at-risk" class. Most of these students consider science their favorite subject (82%), work in small groups (56%), have access to computers at different places in their school (70%) and have access to computers at home (74%). They have been in JASON for one year (55%), two years (17%), three years (5%), four years (4%) and five years (3%).

Based on student surveys, we found that JASON students learned about topics such as volcanoes, lava tubes, plate tectonics, Hawaiian culture, animal adaptation, weather and climate, and Hawaiian ecology. They engaged in scientific activities including lab experiments, library research, group projects, data collection, Internet research and live science broadcasts. They also worked with people besides teachers and classmates, built models, made posters, drew conclusions based on data, developed hypotheses and went on field trips.

JASON IMPACT ON STUDENT LEARNING

CCT's evaluation of the impact of the JASON Project on students has focused more on inquiry than on content skills. Inquiry as an activity or concept allows students to develop a critical and flexible ability to query, explore widely, integrate and apply knowledge to a specific task.

The JASON hands-on and environmental exploration activities are engaging and appealing to the students.

- **Keeps students engaged**
- **Appeals to diverse learning styles**
- **Involves the creation of tangible products**
- **Is especially effective with at-risk students**

Both students and administrators cited the hands-on activities as the most effective tools in the JASON Project curriculum. They felt the labs, activities and field investigations offered by JASON held students' interest more than standard teaching methods. According to the teachers, middle school students in particular are in need of a hands-on approach to learning, which fits their learning styles and identities.

Not only did teachers mention that JASON's hands-on projects kept students engaged as they did the activities, they also appreciated the fact that students come away from most JASON activities with a tangible product. This combination is especially effective with students who may otherwise be difficult to reach academically.

The JASON curriculum makes science real and relevant.

- **Makes science real and relevant to students**
- **Allows students to interact and identify with scientists**
- **Exposes students to experiences they would never otherwise have**
- **Helps students ask better questions**
- **Inspires an interest in science that can extend beyond the JASON experience**

Apart from the hands-on activities, the other component of JASON that teachers and administrators felt was compelling for students was the fact that each year it follows an actual expedition and allows students to see science being done by real-world scientists. This makes science more relevant to students and helps them make connections between what they are learning in school and the larger world.

JASON gives students different ways to experience the scientific research going on each year. Not only do they see the videos and attend the JASON Tele-presence, they can also talk directly to the scientists online. Some teachers suggested that these kinds of contact encourage students to ask good questions.

According to one longtime JASON teacher, the interest in science that JASON can inspire in students because of the connections they make with real scientists sometimes endures longer than their exposure to the curriculum. Having participated in JASON for many years, this teacher is in a position to see what her former students are doing.

Most JASON students acquired scientific inquiry and analytical skills, and outperformed non-JASON students.

- **Enhances student process skills**

  Based on the results of a pre-and post-inquiry test that asked students to answer questions by interpreting data and building an argument, the evaluators found that:

  - Most JASON students (66%) made overall gains (from 1 to 10 points).
  - More than half of the JASON students in each classroom made some gains on the test with the exception of students in one classroom.
  - The average JASON classroom gains were all positive (from .44 to 2.45 points).
  - Most JASON students did better in process (66%) than in content (46%).
  - Average classroom gains in process skills were positive (from .16 to 1.55 points) for all classrooms.
  - Average class scores for content were negative in two classrooms and positive in seven classrooms (from .28 to .91 points).
  - JASON students who scored at or above average (87%) did much better in process than in content areas under the two questions they were asked to answer. In content, the percentages increased from 32% to 38% for question one and 28% to 44% for question two. In process, the percentages increased from 24% to 56% for question one and 21% to 58% for question two.
  - Half of the JASON students in all three grades made significant gains, especially in 6th and 7th grades.

- Students who worked in small groups (72%) on a regular basis in their classrooms also made significant gains in the inquiry test.

In the cases where the inquiry test was administered to a control group, we found that:

- JASON students (52%) did better (1 to 7) than the control group (38%) in the inquiry test.
- JASON students specifically performed better in the area of process/scientific argument building.
- The JASON students (59%) did better in both content and process than the control group (20%) in the two schools where the control group was in the same school as the JASON group.

JASON students consistently scored above average.

- **Boosts overall student gains**

A cluster analysis scoring the three dimensions of understanding, critical thinking and communication skills on a scale of 1 to 5 revealed:

- Fifty percent of the students fell into the High Cluster (from 3.6 to 3.7 points). These scores were high and consistent across the three assessment dimensions.
- Thirty-one percent of the sample fell into the Middle Cluster (from 2.4 to 2.6 points). Scores for this cluster were average.
- Nineteen percent of the sample was in the Low Cluster (from 1.7 to 2.1 points).

A further analysis of the videotaped presentations revealed that:

- The overall scores of more than half the students' videotaped presentations were high (3.8).
- Of the students' videotaped performances scoring at or above three (56%) across three assessment dimensions, most of them did better (66%) in critical thinking.
- Ten presentations (31%) from Texas, Long Island, Arkansas, Michigan and Wisconsin scored high (at or above 3) consistently across the three dimensions of scoring. Inferential statistics from the student's survey data indicate that most of the students from these five states knew the general goals of the JASON project and the topic of this year's JASON curriculum.
- Three presentations from Arkansas and Wisconsin scored very high (at or above 4) across the three dimensions. All three projects addressed topics from the JASON curriculum: plate tectonics, cultures and history of Hawaii and volcanoes.

COMMON CONTEXTUAL ISSUES AND CHALLENGES

All of the contextual elements that distinguish the different sites join to create distinct JASON experiences for students in these environments. However, there were a number of common themes across multiple study sites.

The JASON curriculum is adaptable.

- Teachers pick and choose activities from the curriculum.
- Teachers select activities that support state and district standards.
- Teachers reuse activities.
- However, variable topics mean that JASON may or may not support a grade's required curriculum in any given year.

The success of JASON depends on the teacher.

- The project attracts teachers who take a hands-on approach to science and enjoy learning new subjects.
- The project gives teachers ideas for labs and activities.
- The project requires dedication and innovation on the part of teachers.
- The curriculum is often adopted through a bottom-up process.
- When the curriculum is imposed on teachers they are not enthusiastic about it.
- The project does not suit all teachers' teaching styles.
- Teacher enthusiasm can inspire other teachers to make use of the curriculum.

District and school constraints impeded the process.

- Teachers sometimes pay out of pocket for training and supplies.
- Even inexpensive materials add up in cost when used with many students.
- Teachers need to be very organized to assemble all the necessary materials.
- Changing topics require teachers to purchase new materials each year.
- Schools/districts do not always pay for training for all JASON teachers.
- Teachers have no time to coordinate interdisciplinary projects with other teachers.
- Class periods are too short to conduct JASON activities and field experiments.
- Lack of access to technology prevents teachers from taking advantage of online resources.
- High-stakes testing prevents teachers from using the curriculum if JASON content does not appear on the test.
- Stressed teachers cannot integrate new material into the existing curriculum.

RECOMMENDATIONS

Despite some of the challenges noted above, over the course of a year in the JASON program, students demonstrated an increased ability to understand scientific concepts, draw conclusions based on data and build arguments on the inquiry tests administered to them. Not only were most students' post-test scores higher than their pre-test scores, in those cases where a control group was used, JASON students showed higher gains over time than non- JASON students. When given the opportunity to present their own work, most JASON students showed that they could understand scientific concepts, think critically about these concepts and communicate their ideas effectively.

We found that the JASON Project has an impact not only on students' learning but on teachers' practices as well, particularly in the areas of collaboration, project-based learning, technology use and alternative assessment approaches. Each year when they receive the new JASON curriculum topic and materials, teachers participating in JASON must find ways to creatively revise and refine their curriculum in order to align the JASON content and activities to their state standards. For this reason, teacher commitment to the program is crucial to the successful implementation of the JASON Project at the school and district levels.

Based on our evaluation findings, we propose the following recommendations:

- To avoid a one-size-fits-all mentality without jeopardizing what makes the JASON Project a strong program, JASON staff might want to build different portals of entry for individual users of their print curriculum materials such as "at-risk" students, team teachers, and first-time JASON users. This can be done via a booklet or online interactions focused on the identified needs of the audience being served.

- The JASON Project can provide opportunities for teachers to discuss their practice with experts in the teaching field in the area of accountability in chat sessions or online message boards. These opportunities should be well constructed.
- JASON should provide an opportunity for students to share their work with a larger audience of learners. An example might be an online science fair.

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)

NOTICE

Reproduction Basis

X	This document is covered by a signed "Reproduction Release (Blanket)" form (on file within the ERIC system), encompassing all or classes of documents from its source organization and, therefore, does not require a "Specific Document" Release form.
	This document is Federally-funded, or carries its own permission to reproduce, or is otherwise in the public domain and, therefore, may be reproduced by ERIC without a signed Reproduction Release form (either "Specific Document" or "Blanket").